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IS 14131 (Part 1) : 1994

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Indian Standard

RADIO FREQUENCY CABLES

PART 1 GENERAL REQUIREMENTS AND TESTS FOR SINGLE-UNIT COAXIAL CABLES FOR USE IN CABLED DISTRIBUTION SYSTEMS

UDC 621·315·212·029·5 : 621·397·7

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

June 1994

Price Group 2

Wires and Cables for Electronic Equipment Sectional Committee, LTD 18

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Wires and Cables for Electronic Equipment Sectional Committee, LTD 18 had been approved by the Electronics and Telecommunication Division Council.

The objective of this standard is to lay down the general requirements and test methods of radio-frequency cables used in cabled distribution system.

IS 5026 : 1987 is necessary adjunct to this standard.

While preparing this standard, assistance was derived from IEC Publication 96-03 Rodio-frequency cables Part 3 — General requirements and tests for single-unit coaxial cables for use in cabled distribution systems.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated is to be rounded off, it should be done in accordance with IS 2 : 1960, 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

RADIO FREQUENCY CABLES

PART 1 GENERAL REQUIREMENTS AND TESTS FOR SINGLE-UNIT COAXIAL CABLES FOR USE IN CABLED DISTRIBUTION SYSTEMS

1 SCOPE

This standard specifies the general requirements and tests applicable to single-unit coaxial cables for use in cabled distribution systems.

2 DEFINITIONS

2.0 In adition to the definitions of IS 5026 : 1987 the following additional definitions shall be applicable.

2.1 Single-unit Coaxial Cable for Use in Cabled Distribution Systems

An r.f. coaxial cable generally complying with the requirements of IS 5026 : 1987 used for the distribution of television signals (*see* **3.1** for frequency ranges). The construction of the outer conductor (or screen) is not restricted to a braidded construction, and constructions giving complete metallic enclosure are in current use.

2.2 Structural Return Loss

Defined as 20 times the logarithm to the base 10 of the inverse of the voltge reflection coefficient measured with respect to a specified impedance.

3 REQUIRMENTS AND TESTS

3.0 The requirements and tests specified in IS 5026 : 1987 are applicable unless otherwise stated.

3.1 Frequency Ranges

These shall be designated in accordance with the Radio Regulations of the ITU (Article 2. Section III, No. 112) as follows:

HF	3 MHz	to	30 MHz
VHF	30 MHz	to	300 MHz
UHF	300 MHz	to	3 000 MHz

It should be noted that, in cabled distribution systems the use of the UHF band is restricted to frequencies below 960 MHz and that testing of cables at higher frequencies is not required. (*see* also **3.4** regarding return loss measurements between 3 MHz and 30 MHz.)

3.2 Attenuation and Classification

3.2.1 Cables with Solid Plastic dielectric types A_1/A_2 (*see* **4.2.2.1** of IS 5026-1987) shall be classified as shown below according to the range within which falls the maximum attenuation at 200 MHz and 20°C expressed in decibels per 100 m:

Class Designation	*Attenuation Range* (*dB/100 m*)
2	4·0
2·5	4·0 to 5·0
3	5·0 to 6·0
4	6·0 to 8·0
5	8·0 to 10·0
6	10·0 to 12·0
8	12·0 to 16·0
10	16·0 to 20·0
13	20·0 to 26·0
16	26·0 to 32·0
20	32·0 to 40·0

3.2.2 Cables with Plastic/Air Construction Dielectric of Type A3/A4 (*see* **4.2.2.1** of IS 5026 : 1987) shall be classified, as shown below, according to the range within which falls the maximum attenuation at 200 MHz and 20°C, expressed in decibels per 100 m.

Attenuation data may also be supplied for other frequencies, 30 MHz being preferred for the HF range and 800 MHz for the UHF range.

Class Designation	*Attenuation Range* (*dB/100 m*)
2	<2·0
2·5	2·0 to 2·5
3	2·5 to 3·0
4	3·0 to 4·0
5	4·0 to 5·0
6	5·0 to 6·0
8	6·0 to 8·0
10	8·0 to 10·0
13	10·0 to 13·0
16	13·0 to 16·0
20	16·0 to 20·0

NOTES:

1 When the attenuation of a cable falls on the boundary between to classes, the cable is considered to be in the lower numbered class.

2 Classes may be grouped together to form larger classes when required, the example Class 3 to 5 with an attenuation range of 2·5 dB/100 m to 5·0 dB/100 m.

3.3 Mean Characteristic Impedance

The limits of the tolerance on the mean characteristic impedance Z_m shall be determined according to the class designation, as shown below:

Class Designation	*Mean Characteristic Impedance* Z_m (Ω)
2 to 4 inclusive	75 ± 2·0
5 to 8 inclusive	75 ± 2·5
10 to 13 inclusive	75 ± 3·0
16 to 20 inclusive	75 ± 5·0

3.4 Return Loss

It is possible to measure the return loss of cables either with reference to 75 Ω (the fixed bridge technique) or with reference to the mean characteristic impedance of the sample under test (the variable bridge technique).

Because it is usable over the entire frequency range up to 960 MHz (*see* **3.1**), the fixed bridge technique shall be used unless otherwise agreed betwen the manufacturer and the purchaser.

Return loss measurements in the HF band between 3 MHz and 30 MHz are required only in special cases where this is agreed between the manufacturer and the purchaser.

The minimum value of allowable return loss is determined according to the class designation and the frequency range as shown in Table 1. In each range, no more that three return loss spikes are allowed, extending 4 dB below the indicated limit.

3.5 Screening Efficiency

Under Consideration.

4 ADDITIONAL ELECTRICAL CHARACTERISTICS

4.1 To be Measured

The following electrical characteristics are to be measured and the results expressed as indicated:

Characteristic	*Expressed as*
a) Capacitance per unit length (*see* **6.13** of IS 5026 : 1987)	Picofarads per metre (pF/m)
b) Velocity Ratio (*see* **A-3.1** of IS 5026 : 1987)	The ratio of the Velocity of propagation in the cable to the velocity of propagation in free space
c) D.C. resistance of inner and outer conductor, given separately	Ohms per kilometre (Ω/Km)

4.2 To be Stated

The following electrical characteristic is to be stated by the manufacturer and expressed as indicated:

Characteristic	*Expreseed as*
Temperature coefficient of attenuation	The ratio, expressed as a decimal fraction, of the change in attenuation per celsius degree to the attenuation, at a temperature of 20°C

5 PACKING AND MARKING

5.1 The cable shall be either wound on drums (*see* IS 10418 : 1982) reels or supplied in coils packed.

Table 1 Minimum Allowable Return Loss

(*Clause* 3.4)

Class Designation	Minimum Return Loss (dB)			
	Frequency Range (MHz)			
	30 to 300	300 to 450	460 to 585	585 to 960
2 to 4 inclusive	26	23	22	21
5 to 8 inclusive	23	20	9	18
10 to 13 inclusive	18	*	*	*
16 to 20 inclusive		*	*	

*There is no test at present.

5.2 The cable shall carry the following information either stencilled on the reel or drum or contained in a label attached to it:

a) Reference to this Indian Standard;
b) Manufacturer's name, brand name or trade mark;
c) Type of cable and frequency range;
d) Class designation;
e) Length of cable on the reel, drum or coil;
f) Number of lengths on the reel, drum or coil (if more than one);
g) Direction of rotation of drum (by means of arrow);
h) Approximate gross mass;
j) Country of manufacture; and
k) Year of manufacture.

5.2.1 The cable (packed coil, reel, drum or label) may also be marked with the Standard Mark.

5.2.2 The use of the Standard mark is governed by the provisions of Bureau of Indian Standards Act, 1986 and the rules and regulations made thereunder. The details of coonditions under which the lincence for the use of standard mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

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